

In 1860 he furthered his military studies at the Staff College at Sandhurst, passing the examinations in 1861. At this date geology was taught in the Royal Military College by Prof. T. Rupert Jones, and Hutton, who had taken up the subject with enthusiasm, contributed in 1862 to the *Journal of the Royal United Service Institution* (vol. vi.) an essay on "The Importance of a Knowledge of Geology to Military Men." The importance, strange to say, does not appear to be so fully recognised nowadays. Hutton became captain in 1862, and served for a time as Deputy-Assistant Quartermaster-General at Dublin; but in 1866, having retired from the Army, he emigrated to New Zealand, and devoted himself to the study of natural history, and especially to zoology and geology. In 1871 he was appointed assistant geologist on the Geological Survey of New Zealand, in 1873 provincial geologist of Otago and curator of the Otago Museum, and in 1877 professor of natural science in the Otago University. In 1880 he settled at Christchurch, having become professor of biology and geology in the University of New Zealand, a post which he held until 1893, when he became curator of the Canterbury Museum at Christchurch. He was elected a Fellow of the Royal Society in 1892.

One of his earliest geological papers, a sketch of the physical geology of Malta, was published in the *Geological Magazine* (1866). From this date his work related mainly to the country of his adoption. He prepared official reports on the Lower Waikato district and on the Thames gold-field in 1867, and a report on the geology and gold-fields of Otago (with G. H. F. Ulrich) in 1875. To the Geological Society of London he contributed in 1885 an excellent sketch of the geology of New Zealand, which gave a comprehensive summary of the knowledge attained at that time, and in 1887 he sent to the same society an account of a recent eruption of Mt. Tarawera in North Island. He contributed many other geological papers to the Geological Society and *Geological Magazine*. While distinguished as a geologist, the importance of his researches on zoology was early recognised, and he was elected a corresponding member of the Zoological Society in 1872.

He contributed articles on the fauna and flora of New Zealand, on the land mollusca, the fishes, and the birds, including the extinct moas. Some of these articles were printed in the *Transactions of the New Zealand Institute*, the *Proceedings of the Linnean Society of New South Wales*, in the *Proceedings of the Zoological Society*, in *Ibis*, and other journals.

He was an ardent student of evolution, and among other works issued in 1899 "Darwinism and Lamarckism, Old and New," and in 1902 "The Lesson of Evolution."

After an absence of nearly forty years he paid a visit to this country, and received a hearty welcome from his many scientific friends. He was returning to his home at Christchurch when the announcement of his death on October 27 was received by telegram from the Cape. We are indebted to an obituary in the *Times* for some of the above particulars.

H. B. W.

NOTES.

THE Royal Society has this year made the following awards of medals. The awards of the Royal medals have received the King's approval:—The Copley medal to Prof. D. I. Mendeléeff, of St. Petersburg, for his contributions to chemical and physical science; a Royal medal to Prof. J. H. Poynting, F.R.S., for his researches in physical science, especially in connection with the constant of

gravitation and the theories of electrodynamics and radiation; a Royal medal to Prof. C. S. Sherrington, F.R.S., for his researches on the central nervous system, especially in relation to reflex action; the Davy medal to Prof. A. Ladenburg, of Breslau, for his researches in organic chemistry, especially in connection with the synthesis of natural alkaloids; the Hughes medal to Prof. A. Righi, of Bologna, on the ground of his experimental researches in electrical science.

THE following is a list of those who have been recommended by the president and council of the Royal Society for election into the council for the year 1906, at the anniversary meeting on November 30:—*President*, Lord Rayleigh, O.M.; *treasurer*, Mr. A. B. Kempe; *secretaries*, Prof. Joseph Larmor and Sir Archibald Geikie; *foreign secretary*, Mr. Francis Darwin; *other members of the council*, Dr. Shelford Bidwell, Sir T. Lauder Brunton, Prof. J. Norman Collie, Prof. W. R. Dunstan, Prof. J. B. Farmer, Prof. F. Gotch, Dr. S. F. Harmer, Sir William Huggins, K.C.B., O.M., Prof. E. Ray Lankester, Dr. J. E. Marr, Mr. G. B. Mathews, Mr. H. F. Newall, Sir W. D. Niven, K.C.B., Prof. John Perry, Prof. E. H. Starling, Prof. W. A. Tilden.

At a meeting of the council of the British Association on November 3 it was decided that, in consequence of strong representations by the local committee, the meeting at York next year shall be opened on Wednesday, August 1, which is earlier than the usual date of the opening meeting.

THE council of the British Association has received a gift of 50*l.* from Mrs. John Hopkinson, to be devoted to some investigation which may be suggested at the next meeting by the committee of recommendations.

THE Paris Academy of Moral and Political Sciences has awarded a prize of the value of 600*l.* to Dr. Calmette, of Lille, in recognition of his work in bacteriology and preventive medicine.

WE regret to see the announcement of the death, at forty-five years of age, of Prof. Walter F. Wislicenus, professor of astronomy in the University of Strasburg and editor of the "Astronomischer Jahresbericht."

A CHRISTMAS course of lectures, adapted to a juvenile auditory, will be delivered at the Royal Institution by Prof. H. H. Turner, F.R.S., on astronomy, from December 28 of this year to January 9, 1906.

DR. MAURITS SNELLIN informs us that he has resigned the directorship of the section of terrestrial magnetism and seismology at the Koninklijk Nederlandsch Meteorologisch Instituut. Dr. Snellin's private address is now Apeldoorn, Holland, and any papers intended for him personally should be sent to this address.

At the inaugural meeting of the eighty-seventh session of the Institution of Civil Engineers, held on Tuesday, November 7, Sir Guilford Molesworth, K.C.I.E., the retiring president, formally introduced to the members his successor in the chair, Sir Alexander Binnie, who delivered an address to the members, in which he traced the influence of scientific thought and investigation upon the development of engineering practice. The president subsequently presented the medals and premiums awarded by the council for papers dealt with at the institution in the course of the past session.

THE fifteenth International Congress of Americanists will be held at Quebec on September 10-15, 1906. Papers in each division of the congress will take precedence in the order of the receipt of abstracts. Copies of regulations referring to papers may be obtained from Prof. F. Boas, department of anthropology, Columbia University, New York. The names of intending members or associates should be sent to Dr. N. E. Dionne, Librarian to the Legislative Assembly, Quebec.

Science reports that the Alvarenga prize for 1905 has been awarded to Dr. Chalmers Watson, of Edinburgh, for his essay entitled "The Importance of Diet; an Experimental Study from a New Standpoint." This prize is given by the College of Physicians of Philadelphia, and consists, each year, of the income of the bequest of the late Señor Alvarenga, amounting to about 36*l*. The next award will be made July 14, 1906, provided that an essay deemed by the committee of award to be worthy of the prize shall have been offered. Essays intended for competition must be received by the secretary of the college on or before May 1, 1906.

WE regret to learn that Mr. William Henry Greenwood, the eminent metallurgist, died on October 31 at fifty-nine years of age. He was educated at the Royal School of Mines, and at various periods in his career he held important positions at the works of Sir J. Whitworth and Co., the St. Petersburg Ordnance Works, and the Birmingham Small Arms Works. From 1885 to 1889 he was professor of metallurgy at Sheffield. He was the author of a well known manual of metallurgy, of a treatise on steel and iron, and of a series of metallurgical lecture diagrams, and contributed various papers to the Institution of Civil Engineers, the Iron and Steel Institute, and other technical societies of which he was a member.

THE Society of Arts will commence its 152nd session on November 15 with an opening address from the chairman of its council, Sir Owen Roberts. Among the papers set down for the Wednesday evenings before Christmas is one on the commerce and industries of Japan, by Mr. W. F. Mitchell, at which the Japanese Minister will preside. Sir William Preece will give an account of the recent meeting of the British Association in South Africa, and Mr. F. Martin-Duncan will describe recent applications of the cinematograph for scientific purposes. A course of Cantor lectures by Prof. J. A. Fleming on electric waves will also be given before Christmas. Among the courses of lectures announced for the meetings after Christmas is one under the Cantor trust on modern warships, by Sir William E. White, and one under the Howard trust, by Prof. Silvanus P. Thompson, on high-speed electric generators. The usual course of juvenile lectures will be given this year by Prof. Herbert Jackson, the subject being flame and combustion.

BARON ERLAND NORDENSKJÖLD has published through Reuter's Agency some details of his eighteen months' expedition to the Andes, which was undertaken for the purpose of penetrating the northern forests of Bolivia and studying the Indian tribes along the various tributaries of the Amazon in practically unknown districts. Baron Nordenskjöld left England in January, 1904, his intention being to travel *viâ* the Peruvian port of Mollendo to Puno on Lake Titicaca, at an altitude of 12,000 feet, and thence to La Paz, the Bolivian capital. He visited in all three tribes, the Yamiacas, Guarayos, and Atsapuacas, who, until a couple of years ago, lived like people of the Stone

Age. The two last mentioned, in the main, still retained their original customs. No white man had ever previously visited the Atsapuacas, but yet they were in possession of tools, which they had obtained through other tribes. The expedition was unable to get into contact with a fourth tribe. The explorers marched through their territory and were constantly watched by the people, who, while abstaining from molesting the strangers, would not have any dealings with them. Baron Nordenskjöld states that the Quichuas and Aymaras, living round Lake Titicaca and in the fells of the Andes, are an interesting study for the ethnologist, as they have retained many customs unaltered, or but slightly modified, since the time of the Incas.

FROM a report in the *Times* we learn that the old students of the Royal School of Mines resident in South Africa held their annual dinner at the Rand Club, Johannesburg, on October 7. Mr. J. Harry Johns presided, supported by Mr. A. R. Sawyer and Mr. H. H. Webb. In proposing the toast of "The Royal School of Mines," the chairman emphasised the importance of teaching students to put scientific knowledge to practical use. He laid stress upon the importance of training in mechanical engineering and electricity, and congratulated the Government upon choosing a thoroughly practical engineer to fill the chair of mining at the Royal School of Mines. Mr. Brodigan, in replying, endorsed the general opinion that, considering the national importance of the mining industry to Great Britain, the Government should endow more liberally the leading mining school of the world. A letter was read from the Commissioner of Mines (Mr. H. Weldon), in which he offered a scholarship of 32*l*. to be competed for by the mining students of the Transvaal Technical Institute. Mr. Webb proposed that a register should be kept of all old School of Mines students residing in the country, and stated that the Consolidated Gold Fields of South Africa would always be ready to provide work for a certain number of students who had finished the graduation course at the Royal School of Mines. The students would earn enough at such work to maintain them while they were gaining practical experience. In connection therewith, those who have studied at the Royal School of Mines are requested, should they come to South Africa, to send their names and qualifications to Mr. C. B. Horwood, Rand Club, Johannesburg.

THE tercentenary of the birthday of Sir Thomas Browne, author of the "Religio Medici," "Urn Burial," &c., physician and philosopher, who was born in Norwich on October 19, 1605, was celebrated in Norwich on October 19 with a remarkable display of enthusiasm and interest. A statue by Mr. Henry Pegram, A.R.A., has been placed in the Haymarket at Norwich, close to the site of Sir Thomas Browne's house, and was unveiled by Lord Avebury in the presence of a distinguished company, including representatives of the Royal Colleges of Physicians and Surgeons, London, and of several of the universities and learned societies, who were afterwards entertained at luncheon by the members of the memorial executive committee.

IN the *University Review* for October (ii., No. 6) Viscount Mountmorres writes on the development of the tropics. The article is an indictment of our colonial policy on the west coast of Africa, and the energy of other nations in developing their possessions in this region is contrasted with the lethargy exhibited in our treatment of our own colonies. This applies not only in commerce but in scientific investigations, and, save for several excellent

experimental botanical gardens, there is a whole class of important questions dealing with the mineral, vegetable, and animal products of the country which is practically left to private individuals for solution.

SIR FREDERICK TREVES gave the opening address of the winter series of the Edinburgh Philosophical Institution on October 31, Lord Rosebery presiding. Sir Frederick's subject was "disease"; he said that the common conception of disease is that it is a calamity, and its end destruction, whereas disease is one of the good gifts, for its motive is always benevolent and protective. He demonstrated his proposition by a number of instances, showing that the phenomena of disease always tend to recovery and repair, though he acknowledged that in the case of malignant disease the assertion could be made that there was nothing good in it, to which no answer could at present be given.

MR. L. W. LAMBE, of the Geological Survey of Canada, has favoured us with a copy of a paper, from the *Transactions of the Royal Society of Canada*, on species of Hyracodon and the ancestral horse-like genus Meshippus from the Oligocene of the Cypress Hills, Assiniboia.

No. 3 of the Brooklyn, N.Y., *Museum News* records improvements and additions to the central and children's museums in that city. A special feature is the collection of insects in the children's museum, this group being regarded as a peculiarly suitable one for infantile study owing to the number of its representatives and their adaptations to different modes of life.

PART V. of the first volume of the *Records of the Albany Museum* contains papers on Hymenoptera by Messrs. Cameron and O'Neil, and two on fossil reptiles and fishes by Dr. R. Broom. Several new generic types of fossil reptiles are described, but their affinities are for the most part doubtful; the one fossil fish recorded is referred to the European ganoid genus *Cœlacanthus*.

AN elaborate account of the alimentary tract of the mosquito is contributed by Mr. M. T. Thompson to the *Proceedings of the Boston (U.S.A.) Society of Natural History*, vol. xxxii., No. 6. The ordinary gnat (*Culex pipiens*) and two other species of the same genus afforded material for the investigation, Anopheles not being sufficiently abundant.

THE contents of *Biologisches Centralblatt* of October 15 include an article by Mr. H. Kranichfeld on the probability of the preservation and continuity of favourable variations in animals, with arithmetical calculations; a second (to be continued), by Mr. K. C. Schneider, on the elements of comparative animal physiology; and a third (likewise not completed) on "neurons," or nerve-fibrillæ, by Dr. Max Wolff, of Jena.

In the October issue of the *American Naturalist* Prof. B. M. Davis continues his detailed account of the structure of the vegetable cell, while Prof. T. D. A. Cockerell furnishes a diagnosis of the bees of the genus *Diadasia*, and Dr. H. W. Shimer describes a variety of the brachiopod *Terebratalia transversa* from Alaska, remarkable for the extreme thickness and rugosity of the shell, its abraded umbo, and the presence of a small perforation on each side of the aperture for the pedicel.

THE latest issues of the *Proceedings of the U.S. Nat. Museum* include a list of American cochlidian moths, with descriptions of new genera and species, by Mr. H. G. Dyar; and descriptions of new South American moths, by

Mr. W. Schaus, of Twickenham. The latter comprises no less than 479 species regarded as new, many of them indicating previously unknown generic types, one of the latter being designated *Rothschildia*, in honour of the owner of the Tring Museum.

THE October issue of the *Zoologist* contains a summary of the results of last season's sealing in Newfoundland waters by Mr. T. Southwell, of Norwich. It is very interesting to note that, owing to a postponement of the date for taking the young, the product of a given number of seals has exceeded that yielded by the same number last year by no less than 779 tons. That seals are still abundant is evident from the statement that one of the vessels came upon a "patch" of some 600,000, of which only a few could be killed. These northern harp-seals are stated to differ from those killed further south.

To vol. xxvi., No. 3, of *Notes from the Leyden Museum* Dr. Jentink contributes an important and well illustrated paper on the wild swine of the Malay Archipelago. In the author's opinion all these pigs are indigenous, and each island form represents a distinct species, the long-snouted *Sus oi* of Sumatra thus being distinct from the Bornean *Sus barbatus*. Dr. Jentink appears to be unaware that Mr. Lydekker, on the evidence of photographs sent by Dr. H. N. Ridley, recorded in the *Field* for last year the existence of a representative of this long-snouted group in the Malay Peninsula.

MR. J. WIMMER, of Vienna, has sent us a copy of a "booklet" of sixty-four pages by himself entitled "*Mechanik der Entwicklung der tierrischen Lebewesen*," published at Leipzig by Mr. J. A. Barth. In this work the author discusses, with the aid of diagrams and mathematical formulas, the mechanical adaptations of animals of all classes to the conditions of their existence, and in relation to their modes of progression. One chapter is devoted, for instance, to the mechanics of the external form of the body, a second to those of its internal structure, and a third to those of the movements of the limbs. The work appears to be a concise summary of all the essential facts connected with the subject.

NATURE-STUDY on the part of children formed an essential feature in a paper on local museums (and the discussion which followed) read at the Worcester conference of the Museums Association, as reported in the October issue of the *Museums Journal*. While it was generally agreed that the proper function of local museums is to exhibit local faunas, floras, and antiquities, some difference of opinion was expressed as to whether it is desirable to enlist the services of children in making such collections, one speaker strongly disapproving of any encouragement being given to children to collect. The discussion also took into consideration the question as to whether museum curators should be called upon to assist in teaching, but the general opinion was that if any such instruction was demanded from them it should be confined to educating the teachers.

In part xii. of the report of the Danish Biological Station to the Board of Agriculture, Dr. C. G. J. Petersen discusses the question whether plaice undergo their whole development, from egg to adult, in the open parts of the Baltic Sea. It is well known that the pelagic eggs of the plaice are shed between November and April (most of them in the depth of the winter), and also that the fry are pelagic until such time as they become unsymmetrical, when they seek the warm shallow water of flat sunny shores, this taking place in that part of the Baltic known as the Skaw during May and June. It has been found,

however, that the number of fry which visit the shores bears no proportion to the vast quantities of spawn that are shed; and it is concluded that this loss is accounted for by the fact that the whole development can only take place in cases where the young fish, when they cease to be pelagic, are in such localities that they can be carried by the current to the warm shallow water of the shores, such fry as sink in the cold depths of the Baltic itself inevitably perishing.

IN the report on the botanic station, Grenada, it is mentioned that Mr. R. D. Anstead has been appointed agricultural superintendent, and Mr. G. F. Branch agricultural inspector.

NEW species of flowering plants recorded by Mr. J. N. Rose in vol. xxix. of the *Proceedings of the United States National Museum* include *Dahlia Chisholmi*, *Parnassia mexicana*—the first species of the genus from Mexico—a *Henchera* and *Polianthus*, all from Mexico, and an umbellifer, from the coast of Georgia, with fruits like a *Carum* and leaves modified into hollow-jointed phyllodes, which is made the type of a new genus, *Harperia*.

A COMPREHENSIVE account of the distribution and ecology of the flora of west Prussia, by Mr. J. B. Scholz, appears in vol. xi., part iii., of the *Schriften der naturforschender Gesellschaft in Danzig*. The original flora is described as Baltic, and this has been enriched by the invasion of a south-east European or pontic element, consisting of plants requiring warmth and dryness, that have advanced from the steppe regions. Characteristic pontic species are *Artemisia scoparia* and *Scutellaria hastifolia* in the river valleys, and in the region of the Vistula are found *Stipa pennata*, *Stipa capillata*, *Adonis vernalis*, *Campanula sibirica*, and others. The writer has paid special attention to the plant associations of the moors, heaths, and forests, as they help to elucidate former migrations of plants.

THE analysis of the species of *Hevea* is complicated partly owing to the close relationship existing between them and partly on account of the difficulty of obtaining flowers and fruit. Dr. J. Huber, of the museum at Pará, who has made a study of Brazilian rubber plants, has published a synopsis in vol. iv. of the *Boletim do Museu Goeldi*, Pará. The section *Euhevea* has not been augmented, but in the section *Bisiphonia* the variety *cuneata* has been raised to specific rank, and two new species have been formulated. Of the twenty-one species enumerated, none seems likely to rival the well known *Hevea brasiliensis*; *Hevea Benthiana* and *Hevea discolor* are considered to be the best rubber-bearing trees growing on the Rio Negro.

THE *Century Magazine* for November contains an account of the very important Egyptian finds of Mr. Theodore M. Davis, of Newport, early in the current year. Among the tombs of the kings at Thebes were found those of Ioua and Tioua, father and mother of Queen Tii, wife of Amenhotep III. and mother of the heretic King Akhenaten. In addition to the ordinary appurtenances of tombs, such as vases, the find includes stools, chairs, beds, and other furniture magnificently overlaid with gold. One of the objects found was a chariot, the pole of which was broken, as were many other things; Maspero explains this as a method of killing the object and making it available for the use of the dead, and his view would hardly be questioned by anthropologists, or, we may suppose, by Egyptologists. The writer of the article, however, Mr. Greene,

appears to doubt this explanation, holding that the custom may have been practised in Peru, but that the Egyptians were on too high a level of culture for it to be thinkable that such savage ideas survived among them. This view will hardly commend itself to experts; in fact, savage survivals are conspicuous in Egypt. The article is excellently illustrated with one plate in colours and many photographs, both of the tomb and the objects found there, and of the difficult task of conveying them to a place of safety in Cairo through a land in which honesty is not one of the prevailing features.

MR. A. A. READ gives in *Engineering* the results of a comparison of the principal methods for the determination of manganese in iron and steel. The volumetric results are slightly lower than those obtained by the gravimetric method, but they agree sufficiently closely for practical purposes. With ferromanganese the bismuthate method gives rather too low a result as compared with the ammonium acetate method, probably owing to a small quantity of the permanganate having been decomposed and filtered off with the excess of the sodium bismuthate.

THE Home Office has just published the annual return of the quantity and value of various minerals raised in the United Kingdom in 1904. The total value of the mineral output was 97,477,639*l.* as compared with 101,808,404*l.* in 1903. The decrease is due to a fall in the average price of coal. The production of coal, 232,428,272 tons, was the highest hitherto recorded. The output of gold from Merionethshire rose from 5495 ounces in 1903 to 19,655 ounces in 1904, the value of the gold being 73,925*l.*

WE have received from the author, Dr. H. Potonié, professor at the Berlin School of Mines, a copy of the third edition of his interesting work on the origin of coal (Berlin: Borntraeger Brothers, 1905, price 4*s.*). It is an admirably illustrated pamphlet of 53 pages prepared to elucidate the diorama of a Coal-measure landscape exhibited by the Erkelenz Boring Company at the Liège International Exhibition. It is written in French and German in parallel columns, the French translation having been made by Prof. Gaspar Schmitz, of Louvain. Prof. Potonié's views as to the origin of coal are well known from his previous publications. He now brings forward further evidence to show that, just as at the present time the deposits of humus were almost exclusively formed *in situ*, in previous geological times it was also the rule that such beds were formed at the place where the plants grew from which they were derived.

DR. VAN RIJCKEVORSEL has sent us a copy of an elaborate and valuable discussion entitled "Constantly Occurring Secondary Maxima and Minima in the Yearly Range of Meteorological Phenomena." Dr. van Rijckevorsel, who is an honorary assistant attached to the Meteorological Institute of the Netherlands, and has for many years been known as a conscientious and painstaking investigator in the domain of meteorology and terrestrial magnetism, has divided the present work into two parts. The first portion exhibits ordinary mean daily values and smoothed means for many stations, mostly in the northern hemisphere, for a large number of years, and for various elements, with curves of the normal annual range of temperature. The principal results of the investigation show (1) that the resultant curve of daily normal temperature in the northern hemisphere is a continuous zigzag of maxima and minima; the rise from the winter minimum to the summer maximum is not uniform, but occurs in

spells or periods which at times are so strongly pronounced that the mean temperature falls, instead of rising, for several days together, and these irregularities, generally speaking, occur everywhere at the same time. (2) That this phenomenon is apparently similarly exhibited over the whole globe. (3) That probably other elements than temperature, even those not generally reckoned as meteorological, exhibit the same peculiarity. (4) That it is not improbable that these occurrences are connected with the sun's activity. In the second portion of the work the author endeavours to show that there is great probability that the same phenomenon really occurs in the southern hemisphere, but the data available do not at present allow of positive conclusions. The magnitude of the work undertaken may be gauged from the fact that the observations of some 3636 years have been discussed. In this portion of the discussion Dr. van Rijckevorsel has departed from the usual method of treating the means of observations from any particular locality as a separate unit, but has thrown all the observations for any year together, irrespective of place or date, as he considers that this method gives better data for the object in view.

THE *Proceedings of the Mathematical Society of Edinburgh* for the session 1904-5 open with a systematic paper on the properties of the envelope of the Wallace or Simson line by M. Collignon, including not only geometrical, but also kinematical considerations. Dr. Mackay also publishes a bibliographical note intended to accompany Collignon's memoir. Mr. R. F. Muirhead gives new proofs of Newton's theorem on sums of powers of roots, and also of Waring's expression for the sum of the powers in terms of the coefficients. Mr. E. B. Ross contributes a neat discussion of the degree of contact between a curve and its envelope; and in a paper on polar loci Mr. D. G. Taylor, in order to get rid of the confusion due to multiple values of r for what seems to be graphically one value of θ , imagines an infinite number of parallel planes one above the other slit up from 0 to ∞ along the initial line and joined together so as to form a kind of helical surface. Dr. Muir communicates a note on the condensation of continuants, and Prof. Bromwich gives a useful method for distinguishing the ambiguous cases in the solution of spherical triangles.

In the *Transactions of the Faraday Society* (vol. i., part iii.) Mr. Sherard Cowper-Coles gives an interesting account of the various processes which have been suggested for increasing the rate of deposition of electrolytic copper on a commercial scale. It is claimed that the centrifugal process is at least ten times as rapid as any other process. When the mandrel which constitutes the cathode is rotated with sufficient rapidity, smooth, thick deposits of copper in the form of tubes are obtained which show no trace of lamination. The paper is illustrated by numerous plates, in which the influence of the rate of rotation on the character of the electrolytic copper is clearly evident.

THE supposition that radium is a disintegration product of uranium has received considerable support from the investigations of Strutt, McCoy, and Boltwood. The question whether the production of radium from a pure uranium compound can be experimentally detected would, however, seem to be answered in the negative by recent experiments of Mr. Bertram B. Boltwood, published in the *American Journal of Science*, vol. xx., 1905. Observations on a solution containing 50 grams of uranium, which extended over a period of 390 days, indicate that the quantity of radium formed is less than 1.7×10^{-11} gram.

This is less than one sixteen-hundredth of the quantity which would be expected from the disintegration theory, and the author concludes that one or more products of a slow rate of change intervene between uranium and radium.

THE *Revue générale des Sciences* for September 15 contains a reprint of a lecture which was delivered by Prof. P. A. Guye before the Chemical Society of Paris on new researches on the atomic weight of nitrogen. The author reviews the results already obtained, and concludes that sufficient differences exist to render fresh determinations necessary. The classic gravimetric methods are not considered sufficiently accurate, and a description is given of new methods of determining the atomic weight of the element based on the analysis of nitrous oxide. A spiral of iron wire is heated electrically in a known weight of the gas and the increase in weight found. In another series of experiments, an iron spiral is similarly heated in a known volume of nitrous oxide. The mean value assigned for the atomic weight is 14.009. An article is also contributed to the same number by MM. J. de Kowalski and J. Dalemont on the teaching of applied science at Fribourg University.

AN important paper by Mr. H. v. Steinwehr on the influence of the size of crystals of mercurous sulphate on its relations to electromotive force ("Vorläufige Mitteilung über den Einfluss der Korngrösse auf das electromotorische Verhalten des Merkursulfats") has lately been published in the *Zeitschrift für Instrumentenkunde*, 1905, Heft. vii. The paper deals with a subject of great interest, and one which at the present time is occupying a great deal of attention in all countries in connection with the preparation of standard cells. The author experimented on samples of mercurous sulphate obtained from different makers, and found that they gave a difference of electromotive force equal to 5×10^{-4} volts; it was also found that they varied in solubility. On examining them under a microscope a difference in the size of crystals was observed, the smaller crystals having a higher solubility and higher E.M.F. The subject was pursued both in the direction of reducing the crystals by grinding and of increasing them by crystallisation, and the same result was obtained, viz. the larger the crystals the lower the solubility and the smaller the E.M.F. The author thinks it highly probable that the size of crystals is the chief, if not the only, cause of the differences observed in different samples of mercurous sulphate. He further criticises the conclusions of Hulett that it is the presence of basic salt that affects the result. In conclusion, he discusses the electrolytic method of preparation suggested by Hulett and Fr. A. Wolff and recommended by Carhart for standard cells, stating that it is bound to lead to the production of crystals of very varying size, and the device used by them of continuing the stirring after the circuit is broken cannot have the desired effect, as the crystallisation of mercurous sulphate is very slow. We await with interest the further communication by the author, and hope he will then have some suggestion as to an improved method of preparation.

We have received part i. of a book on leather dressing, including dyeing, staining, and finishing, by Mr. M. C. Lamb, director of the leather dyeing department, Herold's Institute, Bermondsey. This portion, containing thirty pages, is the first of twelve monthly parts of which the book will consist; it deals with sorting, splitting and shaying, and is well printed and illustrated, the working parts of the machines described being explained by

diagrams. Until the book is completed it would be impossible to form an opinion of its value, but the first part promises well.

THE annual report of the board of regents of the Smithsonian Institution for the year ending June 30, 1904, has now been published. As usual, the general appendix to the report, which makes up about seven-eighths of the volume of 804 pages, will prove most interesting to British readers. This appendix contains more than fifty articles upon scientific subjects to which special attention was directed during the year with which the report deals. Five of the articles represent addresses at the congress of arts and sciences held at St. Louis during September, 1904. Among these may be noticed that of Prof. H. H. Turner, F.R.S., on some reflections suggested by the application of photography to astronomical research; Mr. C. T. R. Wilson, F.R.S., on condensation nuclei; and Sir William Ramsay, K.C.B., F.R.S., on the present problems of inorganic chemistry. Two addresses delivered at the Cambridge meeting of the British Association are also reprinted. A generous selection of articles from important American, French, German, and British scientific publications is included, and nearly every department of scientific knowledge is represented. There are several articles which appear to have been contributed specially to this report, and of these may be mentioned the essays of Dr. S. P. Langley on experiments with the Langley aëroplane (see p. 645), Dr. J. O. Skinner on the house sparrow, Dr. Theodore Gill on flying fish and their habits, Mr. Edgar L. Hewett on a general view of the archæology of the Pueblo region, Dr. Alés Hrdlička on the painting of human bones among the American aborigines, and Mr. W. C. Gorgas on the sanitation of the Isthmian Canal zone. The profusion and excellence of the plates and other illustrations again call for remark. Readers who are fortunate enough to have access to these yearly reports are provided with an excellent means of keeping abreast of current scientific studies.

OUR ASTRONOMICAL COLUMN.

ITALIAN OBSERVATIONS OF THE RECENT SOLAR ECLIPSE.—A series of valuable observations of the partial eclipse of the sun was made at Aosta (Italy) on August 30, and the results are given in No. 17 (1905) of the *Comptes rendus*.

The times of contacts, the meteorological changes, and the spectroscopic phenomena were observed in an atmosphere of exceptional purity, and, in connection with the last named, Dom Cl. Rozet describes what he believes to be a unique observation. At about 1h. 40m. (Paris M.T.) the cusp of the crescent sun (position angle about 90°) was projected on to the widened slit of the spectroscope, arranged perpendicular to the solar limb, and the lines C and D₂ were seen very bright and showing a hazy, cloud-like prominence.

The bright line in each case, however, was divided sharply into three parts. First, on the red side was a broad bright line with sharp edges, then came a narrow, well defined dark line, and finally, on the more refrangible edge, a bright line showing the form of the prominence was seen.

MARTIAN METEOROLOGY.—In No. 8, vol. liii., of the *Harvard College Observatory Annals*, Prof. W. H. Pickering discusses a number of photographs of Mars some of which were taken with the 13-inch Boyden telescope at Cambridge (Mass.) in 1888, and the others at Mt. Wilson, with the same instrument, in 1890. Although these photographs do not show the canals and lakes, they show sufficient variation, due to meteorological changes, for a discussion of Martian meteorology.

Prof. Pickering describes, in order, the appearance and

disappearance of clouds, snow, &c., and deduces therefrom some valuable suggestions as to the seasonal changes which take place on or above the planet's surface, giving, in each case, the equivalent terrestrial date at which these changes occur. Nine reproductions from the original photographs, on a scale of 1 mm.=200 km., accompany the paper, and show the clouds, &c., to which Prof. Pickering refers; the Sinus Sabæus and the Syrtis Major are also shown on some of them. On two occasions the height of the clouds above the Martian surface was measured, giving about 15 miles as the result, and Prof. Pickering suggests that the existence or non-existence of such clouds in the equatorial regions may account for the discrepancies noted between various estimations of the amount of the polar flattening.

In conclusion, Prof. Pickering points out that there is now direct evidence of an effective atmospheric circulation of moisture on Mars which would seem to account, adequately, for the observed transfer of precipitation, during the Martian year, alternately from pole to pole.

A 300-YEAR CYCLE IN SOLAR PHENOMENA.—From a lengthy discussion which appears in No. 1, vol. xxii., of the *Astrophysical Journal*, Mr. H. W. Clough, of the Washington Weather Bureau, arrives at the conclusion that a 300-year cycle exists in solar, and the allied terrestrial, phenomena. In the first place, Mr. Clough discusses the observations of numerous terrestrial phenomena which are supposed to be dependently associated with solar changes, and finds that a 36-year cycle is common to these and to solar variations. He then shows that the 36-year cycle varies in length during a cycle of 300 years, and supports this by reference to old observations of various terrestrial phenomena, e.g. auroræ, time of grape harvest, &c., extending back to the early centuries of the Christian era.

SOME SUGGESTIONS ON THE NEBULAR HYPOTHESIS.—In a paper communicated to the Royal Society of Edinburgh, and published in part vii., vol. xxv., of the *Proceedings* of the society, Dr. Halm makes some suggestions, concerning the probable genesis of the solar system, which may overcome some of the difficulties experienced in the acceptance of Laplace's theory. Whilst the Laplacean hypothesis considers that the matter now forming the planets was thrown off by the original rotating nebulous mass, a consideration which is not consistent with the principle of the constancy of the rotary momentum in a system, Dr. Halm suggests that the conditions necessary for the formation of planets were not introduced until after the solar body had condensed from a non-rotating nebula into a spherical body having a diameter probably less than the distance of Mercury. This spherical body then encountered a swarm of meteorites, and finally a ring of these bodies, rotating with orbital velocities about the solar nucleus, was formed.

The planets were formed subsequently by the evacuation of the ring by the larger nuclei existing therein, their rotary motions being generated by the tangential impulses given to each nucleus by the smaller masses falling into it. Many subsidiary considerations are discussed in Dr. Halm's paper, but they are too lengthy to be given here.

SYSTEMATIC ERROR IN TRANSIT OBSERVATIONS OF JOVIAN SPOTS.—We recently referred in these columns (September 21) to a suggestion made by the Rev. T. E. R. Phillips to account for a systematic error in eye-estimates of the transits of Jupiter's spots, and, in the current number of the *Observatory*, Mr. Stanley Williams supplements Mr. Phillips's remarks with a brief discussion of his own results, in which a similar, but larger, systematic error seems to exist. Mr. Williams suggests that the phase-darkening of any long feature such as the red spot, or hollow, may introduce the error. For example, at the quadrature preceding opposition the planet's disc for some distance from the preceding limb is less bright than it is near to the following limb, but at the quadrature following opposition the reverse is the case. As the spot and the hollow are so long, the transit is observed, in practice, by comparing the relative spaces between their ends and the limb, and if the latter are unequally bright, irradiation may lead to such a systematic error as the one which appears in the results.